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09/846,980	04/30/2001	Stephen A. Stockman	M-9635 US	3906
32566	7590	06/01/2005	EXAMINER	
<b>PATENT LAW GROUP LLP</b> 2635 NORTH FIRST STREET SUITE 223 SAN JOSE, CA 95134				SONG, MATTHEW J
		ART UNIT		PAPER NUMBER
		1722		

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 09/846,980

Filing Date: April 30, 2001

Appellant(s): STOCKMAN ET AL.

**MAILED**

JUN 6 1 2005

**GROUP 1700**

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Rachel Leiterman  
For Appellant

**SUPPLEMENTAL EXAMINER'S ANSWER**

This is in response to the appeal brief filed 4/6/2004.

**(10) *Grounds of Rejection***

The following ground(s) of rejection are applicable to the appealed claims:

Claims 6, 9, 11, 36, 39 and 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bour et al. (US 5,926,726) in view of Koike et al. (US 5,811,319) and Furukawa et al (US 6,017,807) as applied to claim 1, 3-5, 12-30, 31-35 and 42-60 above, and further in view of Takatani (US 6,100,174).

The combination of Bour et al, Furukawa et al and Koike et al teach all of the limitations of claim 6, except chemically etching said surface.

In a method of producing GaN group compound semiconductors, Takatani teaches a p-GaN layer epitaxially grown on a sapphire substrate, with about  $10^{19}$  cm<sup>-3</sup> of Mg added thereto for providing a carrier density of about  $1.5 \times 10^{17}$  cm<sup>-3</sup>, where carrier density reads on applicant's term of hole density. Takatani also teaches subjecting the surface of the p-GaN layer to ultrasonic cleaning in acetone and ethanol, thereby removing the oil present thereon and then immersing in an etchant containing HCl and deionized water for about 3 minutes, thereby removing the adsorbed oxide and then the substrate is immersed in an etchant containing HF and deionized water for about 3 minutes thereby removing impurities adhering to the surface, this reads on applicant's limitation of chemically etching. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the invention taught by the combination of Bour, Furukawa et al and Koike with Takatani's etching because it would have removed impurities and adsorbed oxygen from the substrate.

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Referring to claim 9 and 39, Takatani teaches immersing a p-GaN substrate in an etchant containing HCl and deionized water for about 3 minutes, thereby removing the adsorbed oxide and then the substrate is immersed in an etchant containing HF and deionized water for about 3 minutes thereby removing impurities adhering to the surface. This reads on applicant's limitation of chemically cleaning said surface.

Referring to claim 11 and 41, the combination of Bour et al, Furukawa et al and Koike et al teaches all of the limitations of claim 11, except ultrasonically cleaning said surface. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the invention taught by the combination of Bour et al, Furukawa et al and Koike et al with Takatani's ultrasonic cleaning because it would have removed the oil present on the surface of the substrate, which is detrimental to the surface.

Claim 10 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bour et al. (US 5,926,726) in view of Koike et al. (US 5,811,319), Furukawa et al (US 6,017,807) and Takatani (US 6,100,174) as applied to claims 6, 9, 11, 36, 39 and 41 above, and further in view of Peng et al. (US 5,895,223).

The combination of Bour et al, Koike et al, Furukawa et al and Takatani teach all of the limitations of claim 10, expect the cleaning of said surface comprises cleaning in a solution of KOH, NaOH or NH<sub>4</sub>OH.

In a method of etching nitride, Peng et al teaches dipping a nitride chip in an electrolysis liquid and emitting a UV light with a wavelength of 254 nm to illuminate the nitride chip (col 3, ln 40-46), where the electrolysis liquid can be one of KOH as the nitride chip is GaN. It would

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have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Bour et al, Koike et al, Furukawa et al and Takatani with Peng's because the etching method of Peng offers a finer roughness for an etching surface (col 4, ln 20-24).

Claim 13 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bour et al. (US 5,926,726) in view of Koike et al. (US 5,811,319) and Furukawa et al (US 6,017,807) as applied to claims 1, 3-5, 12-30, 31-35 and 42-60 above, and further in view of Peng et al. (US 5,895,223).

The combination of Bour et al, Furukawa et al and Koike et al teach all of the limitations of claim 13, except exposing said surface to electromagnetic radiation.

In a method of etching nitride, Peng et al teaches dipping a nitride chip in an electrolysis liquid and emitting a UV light with a wavelength of 254 nm to illuminate the nitride chip (col 3, ln 40-46), this reads on applicant's limitation of exposing to electromagnetic radiation, where the electrolysis liquid can be one of KOH as the nitride chip is GaN. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Bour et al, Koike et al and Furukawa et al with Peng's because the UV light would illuminate the nitride chip.

Claim 7-8 and 37-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bour et al. (US 5,926,726) in view of Koike et al. (US 5,811,319) and Furukawa et al (US 6,017,807) as applied to claims 1, 3-5, 12-30, 31-35 and 42-60 above, and further in view of Nitta et al (US 5,789,265).

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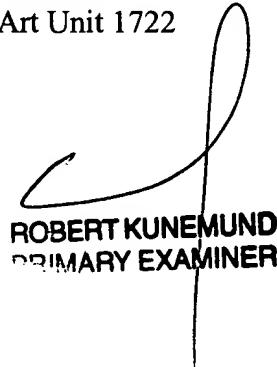
The combination of Bour et al, Furukawa et al and Koike et al teach all of the limitations of claim 7, except plasma etching said surface.

In a method of manufacturing a blue light emitting diode, Nitta et al. teaches a dry etching method for GaN based semiconductor compounds can be achieved by the plasma etching using  $\text{BCl}_3$  and  $\text{Cl}_2$ , where said GaN based semiconductor comprises p-type  $\text{In}_x\text{Ga}_{1-x}\text{N}$  (col 4, ln 41-55). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Bour et al, Furukawa et al and Koike et al with Nitta et al because etching rate can be increased and productivity enhanced.

Referring to claim 8, Nitta et al. teaches a dry etching method for GaN based semiconductor compounds, this reads on applicant's limitation of plasma cleaning said surface.

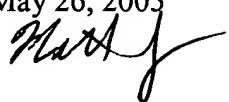
Respectfully submitted,

Matthew J Song  
Examiner  
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ROBERT KUNEMUND  
PRIMARY EXAMINER

MJS

May 26, 2005



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